Energy Deposition: How much beam do we really need?

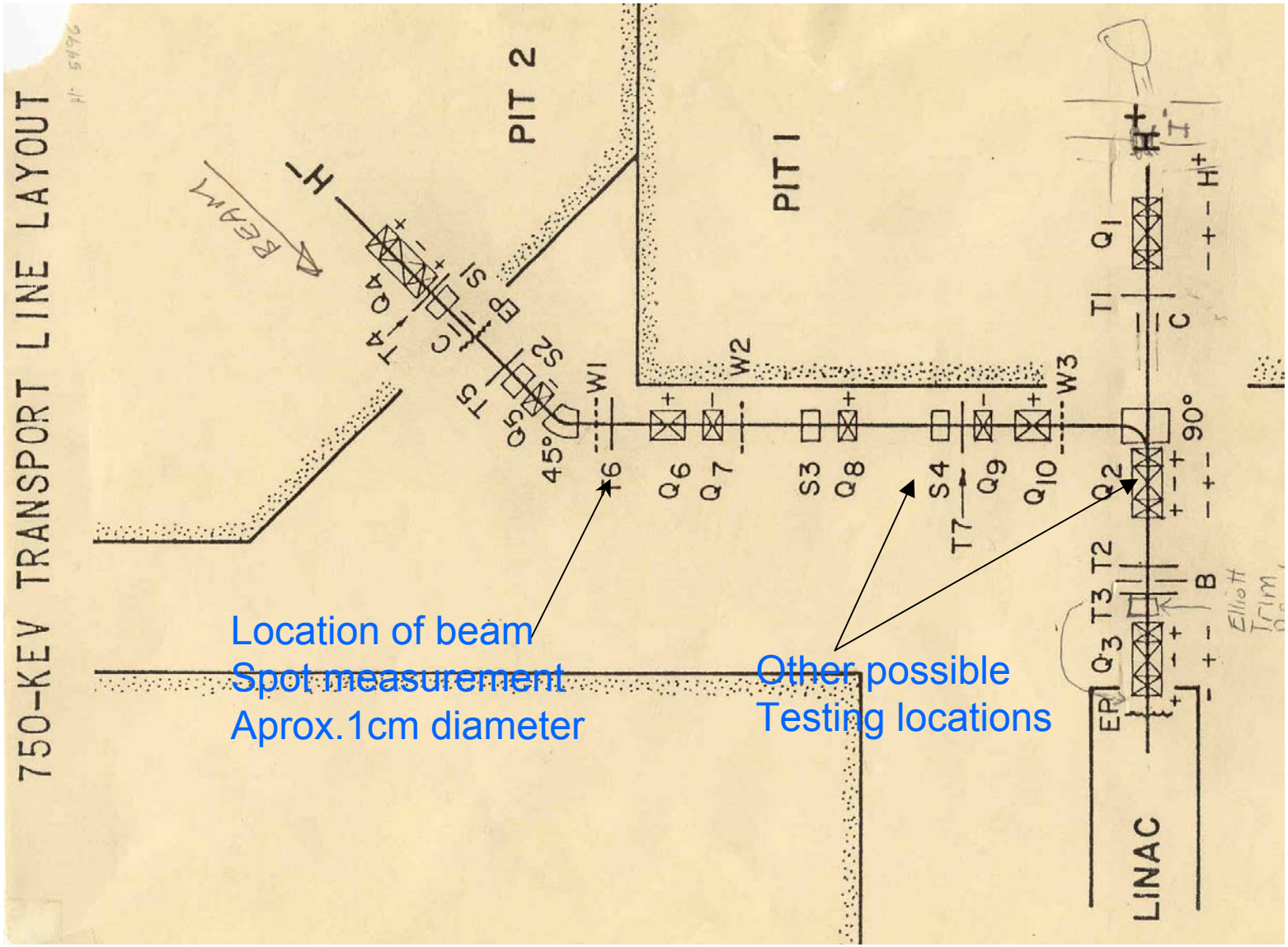
- Numbers from Mikhail suggest for 8 GeV
  - We need 1.2 mA into 1 cm^2 at 750 keV **or**
  - 0.94 mA into 1 cm diameter aperture

At 750 keV Mikhail does not believe MARS

- To match 1 Gev, Brookhaven used
  - 2 mA of H- into 3 mm diameter aperture at 750 keV **or**
  - 22.2 mA into 1 cm diameter
  - Scaling linearly to 8 Gev (as a crude estimate!) we need:
    - 16 mA into 3 mm diameter at 750 keV **or**
      - This is may be doable??
    - 178 mA into 1 cm diameter
      - This is not doable!

- What we can do in the 750 keV line
  - I have roughly measured the beam spot at one location in the 750 line by burning a Kapton foil
    - Approximately 60 mA into 1 cm diameter **or**
    - 0.6 mA into 1 mm diameter **or**
    - 5.4 mA into 3 mm diameter

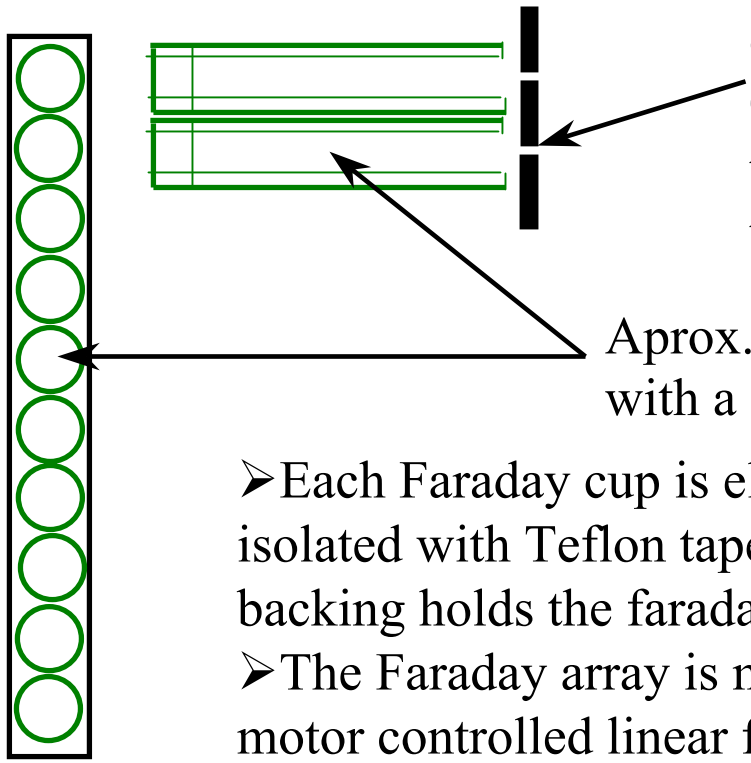
Possible Locations for Diamond Foil Test: Doug Moehs 2/23/04



Comments

- If the intensity is smaller as Mikhail suggests
  - Putting a 1 mm diameter aperture into the beam is viable
  - Measure toroid current down stream to get accurate current density
- If the intensity we need is high
  - We need to get a good current density measurement
    - This requires a way of measuring the beam spot at 750 keV.
    - Needs to be developed.
  - Additional Options
    - We can run at higher currents up to 80 mA
      - this may increase the H^- on target by as much as 33% but the beam spot probable changes so the density changes
    - We can run at a slightly higher energy, up to 770 keV
      - In this range the energy deposition goes up energy.
    - We can make the beam pulse longer, up to 90-100us long
    - We can maximize the focusing of the quads
    - IN DESPERATION: We might be able to increase the repetition rate
      - This increases the beam on target per unit time.

Faraday Cup Array
Used on the test bench



1 mm diameter entrance holes spaced 0.64 mm apart through a 0.75 mm thick Al plate

Aprox. 22 mm deep with a 5 mm internal dia.

- Each Faraday cup is electrically isolated with Teflon tape and a rubber backing holds the faraday cups in place.
- The Faraday array is mounted on a motor controlled linear feed through.

We would need to miniaturize this design in order to look at the 1-2 cm diameter beam spot